Original article

Role of enterocoele in obstructed defecation syndrome: proposal of a new radiological and surgical classification

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Abstract: This study proposes a new classification of enterocoele based on its functional role as a cause of constipation in patients with ODS (obstructed defecation syndrome). We retrospectively evaluated 597 patients (551 F, 46 M) with symptoms of ODS, who had undergone a cine-defecography between November 2001 and November 2005. We classified enterocoele into three groups based on the presence of a radiological pattern of obstructed defecation and the presence of any other functional or anatomical abnormality. An enterocoele was found in 127 females (23%) and 1 male. We recognised prolapse of the small bowel in 103 females and in one male while in 24 females the sigmoid colon descended into the Pouch of Douglas. We found 38 patients (6.9%) with a functional enterocoele, 38 patients (6.9%) with a non obstructive enterocoele and 27 (4.9%)   with an obstructive enterocoele. All the 23 patients with sigmoidocoeles were classified as symptomatic non obstructive. In the group with obstructive enterocoele the finding of a radiological pattern of obstructed defecation was higher (26/27) than in the group without an obstructive enterocoele (23/100) (p < 0.001). In patients with obstructive enterocoele the occurrence of concurrent anatomical and functional abnormalities was lower (p < 0.05) than in patients with other classes of enterocoele. From this study we can infer that obstructive enterocoele impairs rectal evacuation and it can be considered the main cause of obstructed defecation in patients with ODS. This new classification can be useful to determine which cases would be likely to benefit from pelvic surgery.

Key words: Enterocoele; Obstructed defecation syndrome; Cinedefecography; Sigmoidocoele.

INTRODUCTION

Obstructed defecation syndrome (ODS) is clinically defined as a prolonged (more than 6 months) history of difficult rectal evacuation, including excessive straining, feeling of incomplete evacuation or inability to evacuate without digitation. It is usually related to a functional disorder and it occurs most exclusively in females. Many authors [1-4] have reported an incidence of enterocoele from 19% to 35% in patients with ODS. However, the role of enterocoele (defined as prolapse of the small bowel into the rectogenital space) in this syndrome is still controversial.

According to Wexner,[7] the etiological classification of enterocele is: primary when factors such as multiparity, advanced age, general lack of elasticity, obesity, constipation and increased abdominal pressure are present, and secondary when it occurs after gynecological surgical procedures, especially hysterectomy. Another classification of enterocoele proposed by Nichols [8] is based on its origin: 1) congenital (unusual deep Pouch of Douglas), 2) pulsion-mediated (caused by chronic increase of abdominal pressure), 3) by traction (associated with a loss of support of the pelvic floor), 4) iatrogenic (after surgical procedures that change the normally-horizontal vaginal axis to vertical).

In patients with a uterus, the hiatus between the proximal edges of the fascial layers (anteriorly the pubocervical fascia and posteriorly the rectovaginal fascia) is bridged by the cervix and the uterine fundus. One of the most common causes of enterocoele in non-hysterectomized patients is an unusually deep Pouch of Douglas.[5] In hysterectomized patients failure to reattach these layers results in a fascial defect so the peritoneum comes into direct contact with the Pouch of Douglas.[6]

A grading system, proposed by Hale et al., classifies enterocoele as small when the bowel extends 2 to 4 cm below the vaginal apex, moderate when extension reaches 4-6 cm, and large when this distance is greater than 6 cm. Extension up to 2 cm below the vaginal apex is considered to be within the normal range.[9]

The most common symptoms of enterocoele are a dragging sensation in the pelvis and pain in the lower abdomen. Many patients report outlet obstruction [3] and assisted defecation. Some develop faecal incontinence.

Detection of enterocoele is difficult: up to 84% are missed at clinical examination.[11] Its presence and extent can be diag-nosed by endo-ultrasonography and by dynamic magnetic resonance imaging,[12-14] otherwise the functional relevance of an enterocele is diagnosed only in the late evacuation phase during cinedefecography.[15, 16] Defecography or evacuation proctography is a dynamic radiologic technique that involves imaging of the elimination of a barium paste enema from the rectum in order to assess changing anatomic relationships of the pelvic floor and associated organs during evacuation. The main indication to perform cinedefecography is constipation and rectal outlet obstruction.[7, 8] The aim of our study is to demonstrate in patients with clinical symptoms of ODS the incidence of enterocoele, the variable relationship between herniated small bowel, peritoneum and rectal ampulla (the enterocoele may sink into the bottom of the cul-de-sac or float within the Pouch of Douglas) and finally to assess the correlation between different groups of enterocoele and ODS.

MATERIALS AND METHODS

We retrospectively evaluated 597 patients (551 women, 46 men) who underwent a cinedefecography from November 2001 to November 2005. All patients had a full physical examination by a surgeon and completed a questionnaire regarding: age, presence of symptoms of obstructed defecation (defecation frequency, use of laxatives, severe and prolonged straining, perineal dragging sensation, feeling of incomplete evacuation, alimentary disorders), incontinence, parity, history of a previous hysterectomy or cystocoele repair or any pelvic surgery for ODS. The indication for cinedefecography was obstructed defecation in 95% and incontinence in 5% of the cases. Females' mean age was 51 years (range 20-79) and males' mean age was 49 years (range 25-79). In the female group twenty-eight patients (5.08%) had a previous operation for obstructed defecation syndrome (Tab. 1); 180 patients (32.67%) had hysterectomy, 35 (6.36%) had a cystocoele repair (Tab. 2). All patients gave written informed consent to the study.

Cinedefecography

Cinedefecography was performed using the standard technique described by Kelvin et al. in 1992.[17] The rectum was emptied by administration of glycerin suppositories or an enema. Approximately one hour before the examination 300

TABLE 1. – *Previous surgical procedures for obstructed defecation syndrome.*

	Total	Female	Male
STARR (Stapled Transanal Rectal Resection)	17	15	2
Wells' Rectopexy	2	1	1
Delorme's procedure	1	1	–
Orr-Loygue's Rectopexy + Sigmoid Resection	3	3	–
Zacharin'S Rectopexy + Sigmoid Resection	1	1	–
Block Rectocoele Repair	1	1	–
Total Colectomy for slow transit constipation	1	1	–

ml of diluted barium suspension at 60% (Prontobario® 60%-Bracco s.p.a.Milan-Italy) was given orally to opacify the small bowel.[11-18] Patients were asked to empty the bladder. Later the rectum was filled with 200 ml of thick barium sulphate paste at 113% w/v (Prontobario® esofago-Bracco s.p.a-Milan-Italy) injected with a syringe with the patient in the left lateral position on the fluoroscopy table (GE Prestige VH).

Cinedefecography can be divided in three steps: pre-evacuation, evacuation and post-evacuation. Initial radiographs of the pelvis with the patient in the lateral position are taken at rest and with voluntary contraction of the pelvic floor muscles in order to record the pre-evacuation anorectal configuration and pelvic floor position. Then the patient is moved into the upright position and seated on a commode placed on the footrest of an examination table in front of a fluoroscopy unit.[7] While the patient was seated on the commode lateral radiographs were taken during rest and squeezing as a point of reference to locate bone landmarks and to assess the degree of filling of pelvic ileum. A left lateral view of the pelvis was recorded during the evacuation phase (overall the entire fluoroscopic period is limited to 50 seconds).[7] The entire examination was recorded on videotape and each videoclip was analyzed using a computer video capture combined with an image analysis program (Microprint®).

Definitions and radiographic analysis

The following parameters were considered: the anorectal angle (ARA), the pubococcygeal line (PCL), the bi-ischiatic line, the antero-posterior anal canal width, the evacuation time, and the post-evacuation barium trapping. An enterocoele was diagnosed when the barium contrast which filled small bowel loops descended below the pubo-coccygeal line. Sigmoidocoele (Fig. 1, 2) was diagnosed by the presence of gas-filled sigmoid loops in the Pouch of Douglas.[10] Any other concomitant functional and anatomical abnormality was also recorded. A rectal prolapse was

defined as a circumferential descent of the entire thickness of the rectal wall above the anal canal (rectal-ampullar prolapse), involving the anal canal (intracanalicular prolapse) or coming out through the anal verge (external full-thickness rectal prolapse).[19]

We diagnosed a rectocoele when the anterior rectal and posterior vaginal wall herniated into the lumen of the vagina; its depth was assessed by the length of the segment drawn from this axis to the maximum anterior convexity point of the rectocoele.[19]

Pelvic floor descent was defined as the drop of the ano-rectal junction during straining more than 3.5 cm from its resting position at the inferior plane of the ischial tuberosities.[20]

Anismus was diagnosed as a persistent or excessive indentation of the puborectalis sling posteriorly on the rectum at or just above the anorectal junction without an appropriate widening of ARA.[20] Obstructed evacuation was defined as the inability to evacuate 2/3 of the sulphate paste within 30 seconds.[21]

Based upon cinedefecography we radiologically distinguished two types of enterocoele: *a functional enterocoele* (Fig. 3), when the small bowel descends to PCL at straining and without compressing the rectal ampulla and *symptomatic enterocoele* when small bowel or sigmoid colon compresses the rectal ampulla and rises with it at the end of straining. Furthermore, we divided the symptomatic enterocoele into *non obstructive* and *obstructive enterocoele*.

Non obstructive (Fig. 4, 5) enterocoele permits rectal evacuation because it occupies the Pouch of Douglas only at the end of evacuation and allows normal function of the rectal ampulla.

Obstructive enterocoele (Fig. 6, 7) descends in the early phase of voiding and compresses the rectal ampulla to prevent passage of stool. We then describe three classes of enterocoele: functional enterocoele, symptomatic non obstructive enterocoele and symptomatic obstructive enterocoele

The three categories of enterocoele were then evaluated for the presence of a radiological pattern of obstructed defecation and any other functional or anatomical abnormalities. Differences between these groups were considered statistically significative for a p value < 0.05. SPSS 12 (SPSS Inc. Chicago, Illinois, USA) software was used for calculation.

RESULTS

An enterocoele was found in 128 patients (21.44%), 127 females (23.05%) and 1 male (2.2%). One hundred and three females (81%) had a prolapse of the small bowel into the rectogenital space (enterocoele), while the remaining 24 (19%) had a sigmoid colon descent into the Pouch of Douglas (sigmoidocoele).

A functional enterocoele was diagnosed in 38 patients (6.9% of all females - mean age 55 years and range 27-79). The patients in this group had a mean number of pregnan-

TABLE 2. – *Patients with different types of enterocoeles.*

	Control group no evidence of enterocoele	Functional enterocoele	Sigmoidocoele	Symptomatic non obstructive enterocoele	Symptomatic obstructivr enterocoele
N.	424 (76.95%)	38 (6.9%)	24 (4.35%)	38 (6.9%)	27 (4.9%)
Mean age	51 (range 20-79)	55 (range 27-79)	52 (range 20-77)	57 (range 38-73)	56 (range 25-75)
Number of pregnancies	1.5 (0-6)	1.4 (0-4)	1.7 (0-5)	1.1 (0-2)	1.8 (0-4)
Hysterectomy	123 (29%)	3 (7.89%)	3 (12.5%)	18 (47.37%)	10 (37.04%)
Cystocoele repair	7 (1.65%)	0	2 (8.33%)	3 (7.89%)	0
Hysterectomy + cystocoele repair	11 (2.59%)	0	5 (20.83%)	3 (7.89%)	4 (14.81%)
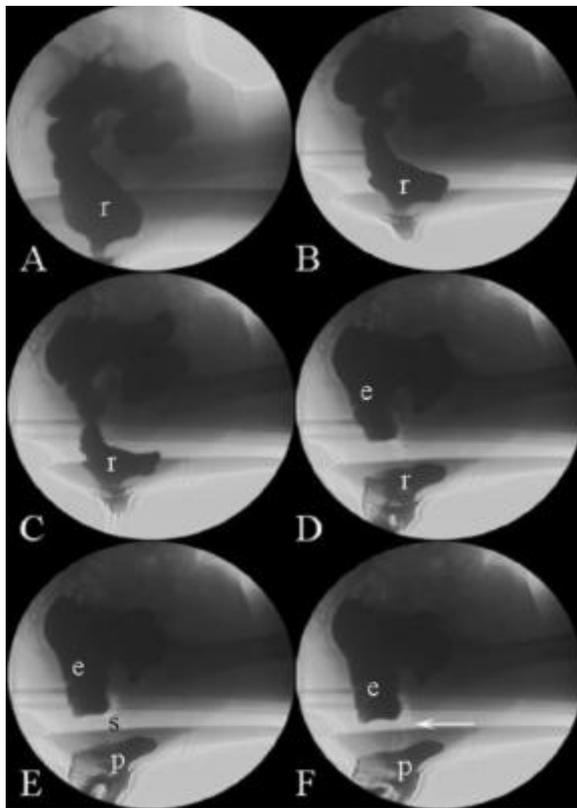
Fig. 1. – A-F: Female, 20 years old, nulliparous, with a history of significant weight-loss. Association of external prolapse (p), perineal descent, *sigmoidocoele* (s in E and arrow in F). Rectum (r) and small bowel loops (e).
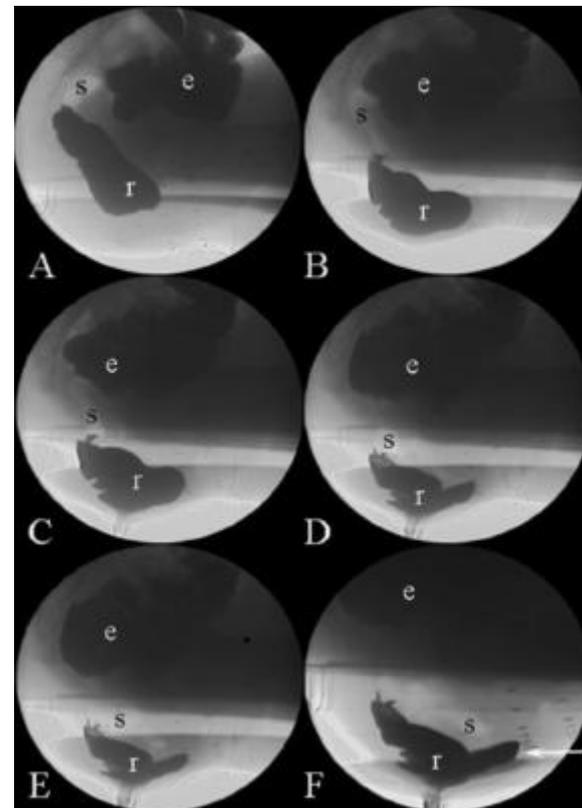
Fig. 2. – A-F: *Sigmoidocoele* (s in E and F). Large anterior rectocoele (arrow in F). Rectum (r) and small bowel loops (e).

cies of 1.4, while 3 (7.89%) had undergone hysterectomy. No patients had undergone a cystocoele repair.

The frequency of obstructed defecation in this group was 37% (14/38) (Fig. 8). Five patients (13.18%) had an isolated enterocoele, while in 33 (86.82%) it was associated with other conditions, as reported in Table 3. Four patients had a combined functional enterocoele with sigmoidocoele.

Perineal descent was present in 10 of 38 patients (26.32%). Thirty-eight patients (6.9% of females with ODS) had a symptomatic non obstructive enterocoele. Their mean age was 57yrs (range 38-73). Hysterectomy had been performed in 47.37% and was associated with cystocoele repair in 3 cases (7.89%). Cystocoele repair alone had been performed in 3 patients (7.89%). ODS was found in 7 patients (18%) (Fig. 8). An isolated enterocoele was noted in 5 patients (13.16%) and associations with other condition are shown in Table 3. Perineal descent was detected in 24 patients (68%).

Symptomatic obstructive enterocoele was found in 27 patients (4.9% of all females - mean age 56 years). Ten of these patients had undergone hysterectomy (37.04%), while 4 patients had undergone cystocoele repair (14.81%). Radiologic obstructed defecation was found in 26 of the patients (96.3%) while 1 patient was incontinent (Fig. 8). Obstructive enterocoele was found as an isolated finding in 13 patients (41.15%), while in the remaining 14 (58.85%) we recognised additional findings (Tab. 3). Pelvic floor descent was present in 4 patients (14.81%). The only male with an enterocoele had an obstructive enterocoele. Sigmoidocoele was found in 24 patients (4.35% of all females - mean age 52 years and range 20 -77 years). The mean number of pregnancies in this group was 1.7. Three patients (12.5%) had undergone a hysterectomy, while 2 patients (8.33%) had undergone a cystocoele repair and 5 patients (20%) had both

procedures. Only 2 patients (8%) had obstructed defecation (Fig. 8). Five patients (20.83 %) had an isolated sigmoidocoele, while 19 patients (79.17%) had additional findings on defecography (Tab.3). The most frequent finding was perineal descent(46%). In the group with obstructive enterocoele the frequency of a radiological pattern of obstructed defecation was statistically significant (p < 0.001). In patients with obstructive enterocoele the occurrence of concomitant anatomical-functional abnormalities was lower (p < 0.05) than in patients with other classes of enterocoele.

DISCUSSION

Obstructed defecation syndrome is a multi-compartment pelvic disorder due to the presence of recto ampullar dysfunction such as rectal prolapse, rectocoele, paradoxic puborectalis muscle contraction, enterocoele and pelvic floor descent.[22, 23] The clinical role of enterocoele is controversial. In many studies it has been considered to be associated with obstructed defecation and constipation.

In 1952 Wallden et al.[24] postulated that the anterior pressure on rectum from an enterocoele may cause a defecation disorder characterized by obstruction. They termed the disorder mechanical rectal obstruction or defecation block.

However, Halligan et al.[25] demonstrated that most of the patients with enterocoele evacuate more rapidly and completely suggesting that enterocoele is not necessarily associated with impaired rectal evacuation indicating that these pouches do not mechanically obstruct defecation; on the contrary, they found a higher incidence of incontinence in patients with enterocoele. The development of transanal resection as a treatment for outlet obstruction [26] has underlined the importance of assessing the presence of an enterocoele. Patients were also asked to empty the bladder before rectal imaging because the presence of a cystocele may prevent the recognition of an enterocoele.[27] Some authors
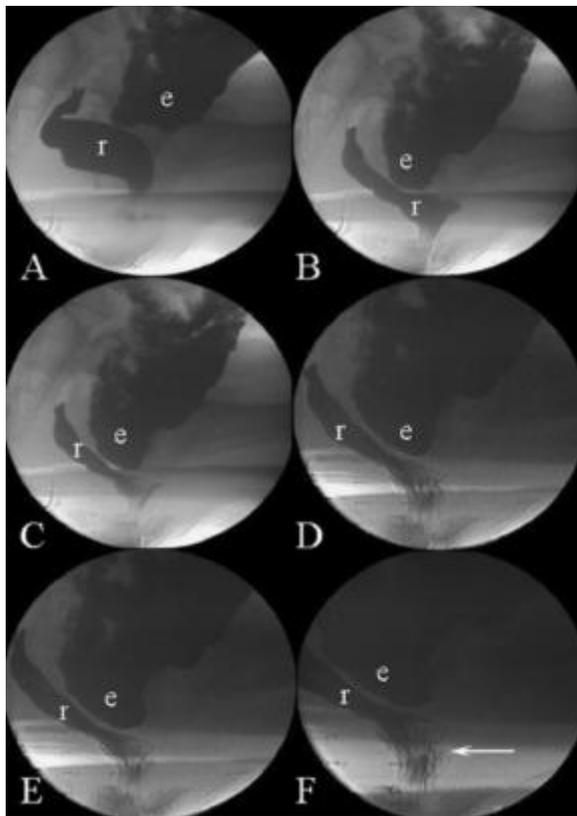
Fig. 3. – A-F: Female, 65 years old, with previous hysterectomy and two deliveries. The *functional enterocoele* (e) reaches the Pouch of Douglas without compressing the rectum (r). The arrow in F shows the intracanalicular prolapse which causes obstructed defecation.

TABLE 3. – *Pelvic floor disorders observed with cinedefecography in patients with enterocoele.*

Additional Findings to functional Enterocoele		
Rectal Prolapse	12	31.58%
Pelvic Floor Descent	4	10.53%
Rectocoele	2	5.26%
Rectal Prolapse + Paradoxic Puborectalis Muscle Contraction	5	13.18%
Rectal Prolapse + Rectocoele	4	10.53%
External Prolapse + Perineal Descent	2	5.26%
External Prolapse + Perineal Descent + Sigmoidocoele	3	7.89%
Perineal Descent + Rectocoele + Sigmoidocoele	1	2.63%
Additional Findings to Symptomatic Non Obstructive Enterocoele		
Rectal Prolapse	5	13.16%
Rectocoele	2	5.26%
Perineal Descent	9	23.68%
Perineal Descent + Rectocoele	9	23.68%
Rectal Prolapse + Perineal Descent + Rectocoele	4	10.53%
Perineal Descent + Rectocoele + Paradoxic Puborectalis Muscle Contraction	2	5.26%
Rectal Prolapse + Paradoxic Puborectalis Muscle Contraction + Rectocoele	2	5.26%
Additional Findings to Symptomatic Obstructive Enterocoele		
Paradoxic Puborectalis Muscle Contraction	4	14.81%
Rectal Prolapse	2	7.41%
Perineal Descent	2	7.41%
Rectal Prolapse + Rectocoele	4	14.81%
Perineal Descent + Rectocoele	2	7.41%
Additional Findings to Sigmoidocoele		
Rectal Prolapse	3	12.50%
Rectal Prolapse + Rectocoele	5	20.83%
External Prolapse + Perineal Descent	4	16.67%
Rectal Prolapse + Perineal Descent + Rectocoele	3	12.50%
External Prolapse + Perineal Descent + Enterocoele	2	8.33%
Perineal Descent + Rectocoele + Enterocoele	2	8.33%

perform a post evacuation image after the proctographic phase to detect an enterocoele. We prefer to document a late evacuation phase during cinedefecography with the patient straining maximally for almost 40 seconds to observe the herniation of intestinal loops in a dynamic setting.

In our study the rate of enterocoele in patients with ODS was 21.44%, while the incidence of sigmoidocoele was 4.35%. These data are comparable to those reported in the literature, where the incidence is reported as 19% to 35%[4] and from 4% to 5.2% respectively.[10-17]

In the group with obstructive enterocoele the number of patients with a radiological pattern of obstructed defecation is higher (26/27 vs 23/100; p< 0.001) than the number of patients without an obstructive enterocoele. The same results can be observed comparing patients with an obstructive enterocoele to those patients who belong to any other class of enterocoele.

Obstructed enterocele is more likely than non obstructive enterocoele to be an isolated pathological condition (41.15% vs 13.16%, p < 0.05). Anatomical and functional abnormalities are less frequent in obstructive enterocoele (58.85% vs 86.84%; p<0.05) than in other classes of enterocoele. This data confirms the hypothesis that an obstructed enterocoele, often isolated, may be the real cause of ODS in these patients. Our conclusions differ from those of Halligan et al.[25] The reason could be that in Halligan's population the majority of patients probably had only functional and non obstructive enterocoeles, as defined by our classification, without having a true obstructive enterocoele. The identification of obstructive enterocoele, which seems to be the main cause of obstructed defecation, is important in determining which patient to refer to pelvic surgery.

The presence of clinical and radiological signs of incontinence[1-19] associated with the diagnosis of enterocoele can be explained by the high incidence of perineal descent (58%) in patients with symptomatic non obstructive enterocoele. This is the most frequent type of enterocoele detected. The same condition is found in patients with sigmoidocoele who have pelvic relaxation that results from weakening of the supporting vaginal tissues and the pelvic diaphragm.[7] This is demonstrated by the increased incidence of perineal descent (46%), the association with a functional enterocoele (16.6%) and by the presence of an external full-thickness rectal prolapse (25%). The association between sigmoidocoele and enterocoele was also observed in 3 of 9 sigmoidocoeles in Fenner's study[28] whereas in our study we found it in 4/24 patients (16.66%). In the group of patients with sigmoidocoele we found a very low incidence of obstructed defecation (2/24: 8.33%). This group has a higher rate of previous hysterectomy and cystocoele repair. However, we found even younger patients (mean age 52 years old) with a past history of gastrointestinal disorders and poor pelvic floor function. These factors probably weakened the muscular fibers of the pelvic floor with subsequent loss of support. 7 It is clear from imag-
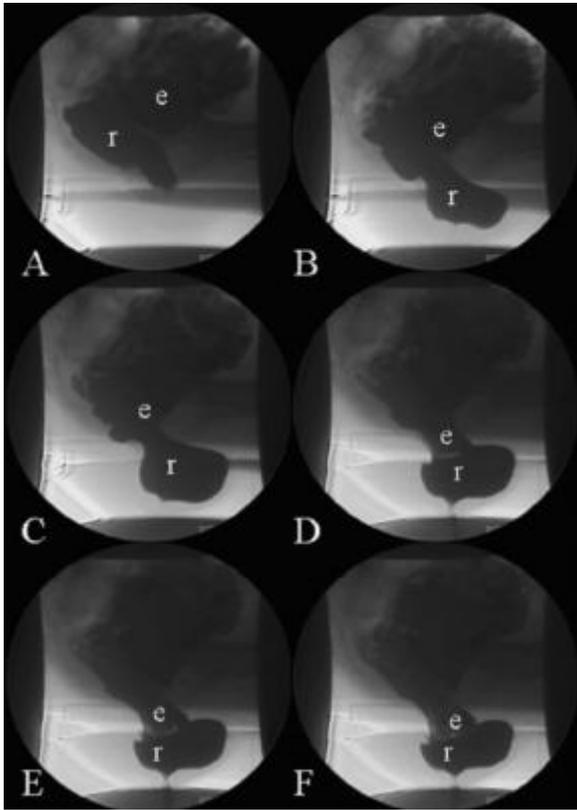
Fig. 4. – A-F: Female, 49 years old. Non relaxing puborectalis syndrome with indentation of the puborectalis muscle on the posterior wall of the ampulla (r) and no significant change in the anorectal angle during defecation. Association of perineal descent, anterior rectocoele with barium trapping and *non obstructive enterocoele* that compresses the ampulla without blocking it in the late phase (D) of defecation.
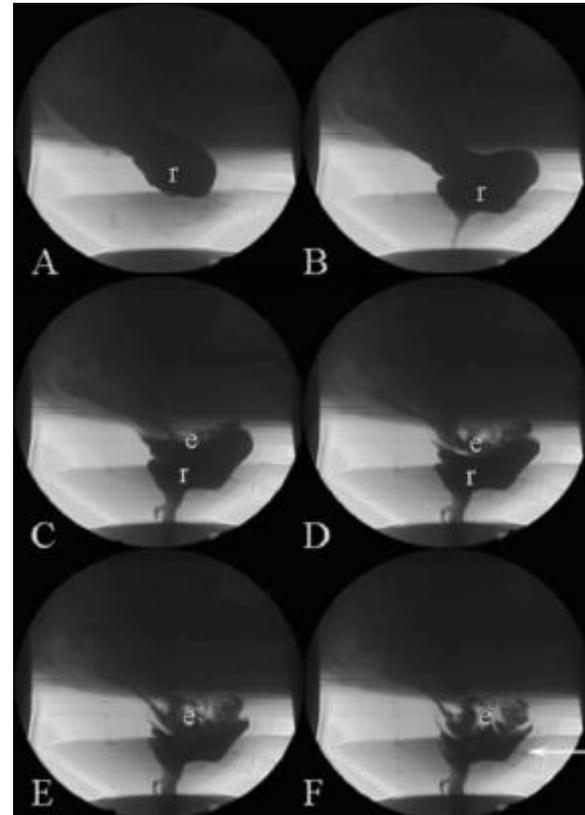
Fig. 5. – A-F: *Non obstructive enterocoele* (e) reaches the Pouch of Douglas compressing the rectum (r) without obstructing the ampulla. Association with perineal descent and anterior rectocoele.
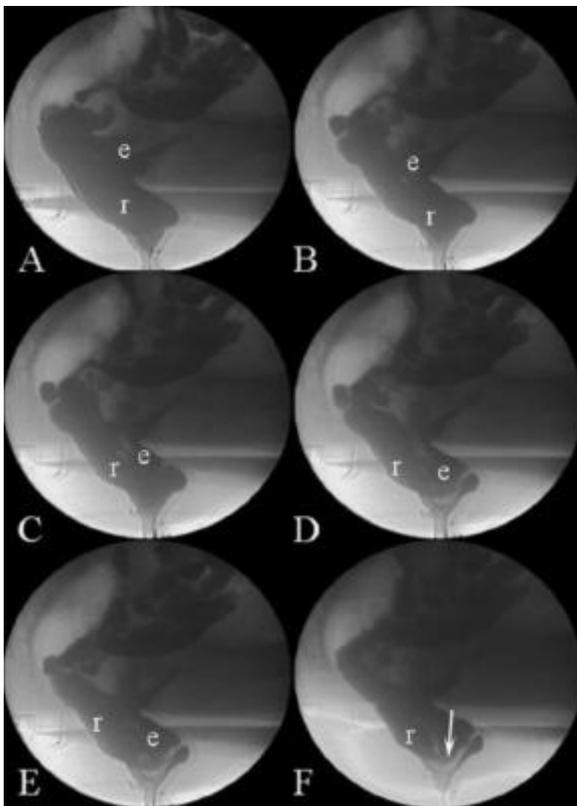
Fig. 6. – A-F: Female, 65 years old. *Obstructive enterocoele* (e) compresses the ampulla (r) in the early phase of voiding (B:C) and, moving towards the anus, blocks rectal emptying (arrow in F). No evidence of associated functional or anatomical disorders.
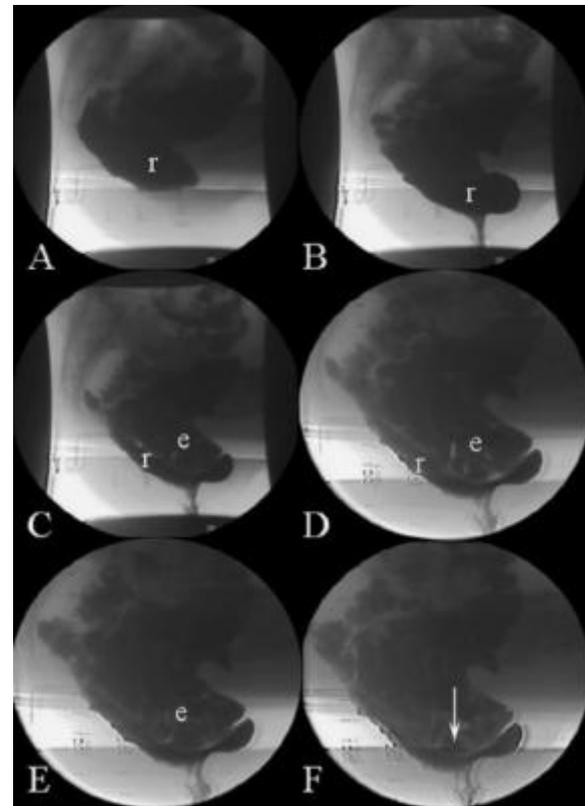
Fig. 7. – A-F: Female, 55 years old with previous hysterectomy and one delivery. The ampulla (r) is completely compressed by the *obstructive enterocoele* (e and arrow in F). No evidence of associated functional or anatomical disorders.
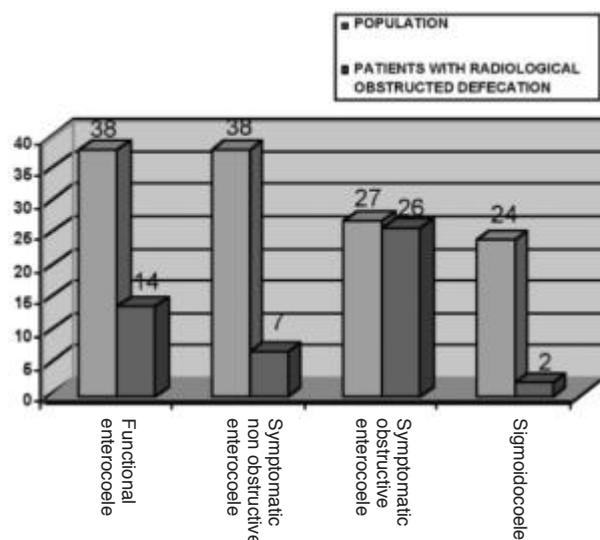
Fig. 8. – Frequency of obstructed defecation in patients with different types of enterocoele.

ing that a sigmoidocoele compresses the rectal ampulla only in the late phase of defecation. In our classification this condition is called "symptomatic non obstructive" enterocoele.

Otherwise, the frequency of hysterectomized patients (i.e. secondary enterocoele) is very high in obstructive and non obstructive enterocoele (respectively 51% and 47%); the frequency of cystocoele repair is similar. These results may suggest a possible role also for hysterectomy and cystocoele repair in the pathogenesis of symptomatic enterocoele (obstructive and not obstructive).

CONCLUSION

We propose a new classification of enterocoele based on its causative role in obstructed defecation in patients with ODS. In fact, we believe that it is possible to identify a functional enterocoele which does not compress the rectal ampulla and a symptomatic one that does compress the rectal ampulla. Enterocoele can be further classified as either an obstructive or non obstructive enterocoele. The first one is often associated with a radiological pattern of obstructed defecation and it's usually present as an isolated condition, probably being the only cause of obstruction in these patients. The second one, which is less associated with obstructive defecation, is usually related to other pathological conditions. Once validated, this classification could define the role of enterocoele in the pathogenesis of the obstructed defecation syndrome and allow the surgeon to design the best procedure and consequently improve the chances of a successful outcome.

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